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*Thomas Jefferson and science.*<sup>1</sup> AUSTIN H. CLARK, U. S. National Museum.

## VIRGINIA IN JEFFERSON'S TIME

The career of every man is largely a product of his time and environment, of his birth, early surroundings, education, and associates, especially the associates of the formative period of his youth. No true appraisal of any man can be made without some knowledge of his background and of the influences that surrounded him, especially in his early years.

In Jefferson's time, Virginia had already acquired an enviable scientific tradition as a result of the work of Harriott, White, Hamor, Rolfe, the Claytons, Bannister, Mitchell, Glover, Catesby, Tennent, Carter, Lee, and others. Unfortunately the printed records do not give a complete picture of science in Virginia in the early colonial days, partly because of the scarcity and cost of paper, most of which was imported from Europe, chiefly from the continent. Nearly all the paper mills in America were situated in Pennsylvania and New Jersey, and their output was for local consumption.

In Jefferson's early days Virginia was to a considerable extent a feudal state, more or less on the English model, most of its best land being held by large landed proprietors. With the rapid opening up of the Piedmont, on which great estates worked by slave labor were not so practicable as they were on the flat and rich Coastal Plain, various social problems were beginning to arise. At the same time Virginia, now fairly well settled, was beginning to feel herself quite competent to manage her own affairs and was becoming restive under the domination of the English parliament, for she

regarded herself as a sister rather than as a child of England.

Jefferson was a product of the Piedmont area, then almost a frontier region, and, though peculiarly fortunate in the circumstances of his birth and education, he did not view social conditions in the same light as did his aristocratic friends of the great estates on the rich and long settled Coastal Plain, with whom, however, he was always on the best of terms.

His sympathetic appreciation of the attitude both of the southern aristocracy and of those who, living in the wilder portions of the great new country, were trying to settle, cultivate, and organize the great wilderness, and his ability to harmonize their two viewpoints, can be really understood only in the light of his early environment and upbringing.

## EARLY ENVIRONMENT, EDUCATION, AND ASSOCIATES

Peter Jefferson lived at Shadwell in Goochland, now Albemarle, County, Va., an unusually beautiful region of mountains, rolling hills, and river bottoms, its plant and bird life as diversified as its scenery, its lowlands with abundant relics of the former Indian inhabitants. He was a surveyor, and one of ability, for to him belongs the credit for preparing the first accurate map of Virginia, the so-called Jefferson and Fry map, published in London in 1775 under Jeffreys, the Royal Geographer. His wife was the former Jane Randolph, eldest surviving child of Isham Randolph of Dungeness, Goochland County, a well-known lover of plants, who corresponded with Peter Collinson in England and with other famous botanists of that time.

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Their son Thomas had a great respect for his father's map, and from him, as suggested by Dumas Malone, he doubtless acquired much of his zest for exploration and drawing, and his liking for untrodden paths. From him, perhaps, he also acquired his fondness for mathematical subjects. From his mother's side he may have inherited that love of plants that throughout his life was so very characteristic of him, and his interest in birds.

On the death of his father in 1757 Thomas was placed under the guardianship of a neighbor, Thomas Walker, physician, soldier, and explorer, who had been with Braddock at Fort Duquesne in 1755 and who had traveled extensively in that vast area which at that time was included in western Virginia. According to Thomas P. Abernethy, Thomas Walker was typical of that company of bold spirits who explored and exploited the early frontiers—a man of action rather than of words.

In 1760 young Thomas entered the College of William and Mary, unusually well prepared by long attendance—since the age of five—at an excellent school, the so-called “English School,” of which he personally had formed a poor opinion. At Williamsburg he found surroundings that for a keen young man with the widest possible interests were ideal. At that time the titular governor of Virginia was John Campbell, Earl of Loudoun, but the government was administered by the lieutenant governor, Col. Francis Fauquier, a true friend of Virginia and the Virginians, a devotee of the sciences who had been elected a Fellow of the Royal Society in 1753, and a director of the South Sea Company in 1751. With Colonel Fauquier there had come to Virginia in 1758 Dr. William Small, of Birmingham, who first held the chair of mathematics at William and Mary, and later that of philosophy, *ad interim*. These two delighted in the society of young men, and at Colonel Fauquier's table, where Dr. Small was a constant attendant, the youths of Virginia, Thomas Jefferson, John Page, John Walker, James McClurg, and others, “learned their lessons in the rights of men.” In later years Jefferson referred to Dr.

Small as the man who had fixed the destinies of his life, and John Page eulogized him as “the illustrious professor of mathematics . . . the darling friend of [Erasmus] Darwin.” He might have added that he was also an intimate friend of James Watt.

At William and Mary, Jefferson and Page became fast friends, sharing their ideas and confidences. It was to Page that Jefferson wrote the letters that reveal his youthful romance with “the fair Belinda,” who later married Jacquelin Ambler. The correspondence between Jefferson and Page covered 50 years without a trace of discord, and 30 years after their William and Mary days Jefferson declared to Albert Gallatin that he loved Page like a brother. In the election for governor of Virginia in 1779 Jefferson and Page were pitted against each other. Jefferson was denounced as a radical and Page as a tool of the Tories. The two candidates announced their platforms and retired to their estates, leaving the campaigning to their partisans. After the election, when Page sent congratulations to his victorious opponent, Jefferson replied that he derived special satisfaction from the fact “that the difference of the numbers which decided between us, was too insignificant to give you a pain, or me a pleasure, had our dispositions towards each other been such as to admit those sensations.” Page, who was lieutenant governor under Patrick Henry and later (1802–5) governor, spent much of his time in scientific investigations. With his friend David Jameson he was interested in astronomy and made experiments in the accurate measurements of the fall of rain and dew. He also suggested, as early as 1779, the identity of magnetism and electricity. For a time he was president of the Virginia Society for the Promotion of Useful Knowledge, at Williamsburg, a group that sought to play in Virginia the role of the Royal Society in London. In later years he confessed that he did not think he had made great proficiency in any study, for he was too sociable to shut himself off in solitude as did his friend Jefferson.

John Walker was a son of Thomas Jefferson's guardian, Thomas Walker. He subsequently served on the staff of General

Washington as an extra aid with the rank of colonel, and also served in the United States Senate, by appointment from the Governor of Virginia, to fill the vacancy caused by the death of William Grayson. He was elected a member of the American Philosophical Society in 1770.

James McClurg was a more serious student than either Jefferson, Page, or Walker. After graduating from William and Mary he attended the medical school at the University of Edinburgh, from which he graduated as a Doctor of Medicine in 1770. While there he was a prominent member of the Virginia Club, an organization composed of Virginians studying at the school. After graduation he devoted some time to post-graduate medical studies in Paris and London, returning to Virginia in 1773. During the Revolution he was active as a surgeon in the Virginia militia, being referred to in the official records as physician-general and director of hospitals for the State. He was professor of anatomy and medicine at William and Mary from 1779 to 1783, after that living in Richmond. He was elected a member of the American Philosophical Society in 1774, and was also a member of the Virginia Society for the Promotion of Useful Knowledge. He was a member of the Philadelphia Convention, and later of the Executive Council for Virginia during the early years of Washington's administration. He was regarded as one of the most eminent physicians in the State and was president of the State medical society in 1820 and 1821. The first volume of the *Philadelphia Journal of Medical and Physical Sciences* published in 1820 was dedicated to him. According to James Madison, Dr. McClurg's talents were of the highest order, but he was modest and unaccustomed to exert them. Possibly his interest in his profession precluded any pronounced ambition toward a political career. Jefferson maintained a close friendship for McClurg, for whom he seems to have had great respect.

Such were the favored associates of young Jefferson at William and Mary, mature men of exceptional ability, sympathetic with, and fond of, the young, and young men of unusual promise. He graduated in

1762 at the age of 19 with a reasonably thorough reading knowledge of Latin, Greek, and French, and a familiarity with the higher mathematics and with the physical sciences rarely possessed by young men of his age. Fortune favored him still further, for after graduation he entered the law offices of George Wythe, then the leader of the Virginia bar, whom he described as "the best Latin and Greek scholar in the State," and as a "faithful and beloved mentor in youth and most affectionate friend through life."

He was admitted to the bar in 1767 after five years of study. After his admission to the bar he practiced law with more than usual success, and was elected to the House of Burgesses in May, 1769, and appointed surveyor of the County of Albemarle in 1773. From this time on he became more and more intensively interested in politics; though his interest in science never diminished, he was seldom able to devote much time to it.

#### PERSONALITY

At the time of his admission to the bar he was described as 6 feet 2 inches tall, slim, erect as an arrow, with angular features, a very ruddy freckled complexion, an extremely delicate skin, full deep-set hazel eyes, and sandy hair. Known to his friends as "Long Tom," he was a gay companion, an expert musician, the violin being his favorite instrument, a good dancer, a dashing rider, and proficient in all manly exercises. He was then, and continued to be throughout his life, frank, earnest, cordial, and sympathetic in his manner, full of confidence in men, and sanguine in his views of life. He seems to have been a recognized member of the closely knit social group made up of the children of the great families of Virginia.

As a mature man he had by nature a scientific mind, and he once remarked that "the tranquil pursuit of science" was his "supreme delight." He also wrote that he was "for encouraging the progress of science in all its branches, and not for raising a hue and cry against the sacred name of philosophy." He regarded "freedom and science"

as the prerequisites of progress, and said that he had "sworn upon the altar of God eternal hostility against every form of tyranny over the mind of man."

His legal training made him cautious in drawing conclusions from a series of isolated facts, and therefore impatient of all theories not logically deduced from adequate premises. In a letter to Charles Thompson written from Paris on September 20, 1787, he said "I wish that the persons who go thither [to the western country] would make very exact descriptions of what they see of that kind [*i.e.*, fossil bones], without forming any theories. The moment a person forms a theory, his imagination sees, in every object, only the traits which favor that theory. But it is too early to form theories on these antiquities. We must wait with patience until more facts are collected."

He was essentially of a reflective type, and it was his habit to seclude himself from time to time, while he diligently studied some branch of science as a relief from the grim realities of political and other worries. This habit of letting his mind lie fallow, so to speak, and thus to clear itself of unimportant details, probably had much to do with the brilliant manner in which he viewed all subjects in the light of their essential features, without being led astray by superficial emotional aspects.

In everything he did his custom was to sow the seed carefully, nurse it for a while, and then, when its successful growth seemed assured, turn it over to others for its further development and ultimate fruition, usually under his stimulation and guidance. In science, as in everything else, he followed this line. And so it happens that, judged from the record, his main scientific interests were in those lines that were most backward and in which vigorous and intelligent leadership was most needed, especially those lines that would ultimately prove of greatest value to the people.

Perhaps the most remarkable and outstanding feature of Jefferson's character was his complete freedom from personal jealousy. Freedom of thought was no mere political phrase with him. Everyone, according to him, was entitled to his own

ideas. Naturally, he differed with many people, but these differences he never took personally. A good illustration of this is seen in his attitude toward the contest between himself and John Page for the governorship of Virginia. He had an immense number of loyal friends, many of whom disagreed with his political outlook, though they never distrusted his sincerity. Dr. George Gaylord Simpson rightly says that "it is a measure of his greatness that Jefferson continued his powerful aid to paleontology and his warm friendship with its students even when it became evident that this aid and these students were revealing the falsity of views that he had vehemently and almost religiously expressed and maintained during the greater part of a long life."

#### JEFFERSON'S SCIENTIFIC INTERESTS

As a scientific man Jefferson was interested in all lines of science, but in all rather as an enthusiastic, highly appreciative, and intelligent amateur than as a professional. He had no time to make himself thoroughly proficient in any one line. The working out of the details he left to others, whom he assisted and encouraged to the best of his ability. His tremendous enthusiasm, which continued unabated, or perhaps even increased, during his term of office as President of the United States, was a most important factor in bringing before the people the value of science.

Tangible evidence of Jefferson's many and varied scientific interests is furnished by his contributions to the proceedings and collections of the American Philosophical Society in Philadelphia, of which he was elected a member, together with George Washington, in 1786, after the death of David Rittenhouse succeeding him as the third president of the Society on January 6, 1797. His contributions to the Society's program and collections were in the fields of meteorology, chemistry, economic entomology, archeology, vertebrate paleontology, and applied mechanics in reference to agricultural operations.

On December 17, 1779, there was recorded in the Society's proceedings a letter

from Rev'd Wm. Maddison (*sic*), president of William and Mary College, containing "a series of Meteorological Observations by His Excellency Governor Jefferson and himself separately, for a year and a half; likewise a set of Experiments on what are called 'Sweet Springs'." On April 15, 1791, on motion of Jefferson, a select committee (consisting of Jefferson and four others) was appointed to collect materials for forming the natural history of the Hessian fly and determining the best means for its prevention or destruction "and whatever else relative to the same may be interesting to agriculture." On August 19, 1791, he presented to the Society "a curious piece of Indian sculpture, supposed to represent an Indian woman in labor, found near Cumberland River, Virginia." On August 19, 1796, his letter to Rittenhouse (deceased) describing bones of extraordinary size found beyond the Blue Mountains in Virginia [in a cave in Greenbrier County, W. Va.] "appearing to be of the Tyger-lion & Panther species" was read by Dr. Barton. Under date of March 10, 1797, we read: "Jefferson's memoir 'On the Discovery of certain Bones of a Quadruped of the [space of four lines left blank].' A resolution was passed ordering the memoir to be put in the hands of the Committee of Selection of Publications, drawings of the bones to be made by a proper person. Mr. Peale was requested to put the bones 'in the best order for the Society's use'." These were the bones of the famous *Megalonyx*, the first giant sloth found in North America, and formed the subject of the only scientific memoir ever published by Jefferson, which appeared in 1799. On January 19, 1798, he presented to the Society bones of a mammoth "some time ago found in Virginia." On April 20, 1798, he presented a hand threshing machine invented by T. C. Martin of Virginia, "which he had procured to be made." On May 4, 1798, a "Description of a Mould Board of the least resistance, &c.," by Mr. Jefferson was read and referred to Mr. Patterson. This is the first mention of his famous plow. On May 7, 1804, W. Lewis, of Campbell County, Va., donated a bone and some rocks through

Jefferson. On April 27, 1805, William Bartram sent some bones to be forwarded to [Jefferson at] Monticello.

Much more detailed evidence of his extensive interests is furnished by his famous book on Virginia. In June, 1781, he was injured by a fall from his horse, and he occupied the leisure forced upon him by this accident in organizing the abundant and accurate memoranda that he had accumulated over a series of years. These memoranda were arranged in the order of a series of questions that had been submitted to him by M. Barbé de Marbois, Secretary of the French Legation. During the winter of 1782-83 he revised and expanded them and had them published in Paris in 1784 under the title of "Notes on the State of Virginia." The date of this work is given as 1782, which is probably the date of the completion of the manuscript, as he did not reach Paris until 1784. Two hundred copies were privately printed, as the work was not intended for general distribution. According to Sabin, a copy presented to M. Malherbe has the following note in Jefferson's hand writing: "Mr. Jefferson having had a few copies of these notes printed to present to some of his friends, and to some estimable characters beyond that line, takes the liberty of presenting a copy to M. de Malherbe, as a testimony to his respect to his character. Unwilling to expose them to the public eye, he begs the favour of M. de M. to put them into the hands of no person on whose care and fidelity he cannot rely, to guard them against publication."

This work, however, did not long remain confidential. A French translation, with a map, entitled "Observations sur la Virginie, par M. J\*\*\*. Traduit de l'Anglais," was published in Paris in 1786, and an English reprint of the original was published in London in 1788. The first American edition was published in Philadelphia in 1788. In the *Virginia Independent Chronicle* (Richmond) for Wednesday, December 12, 1787, we read that "the work will be comprised in a handsome octavo volume, with an elegant type and good paper, and delivered to the subscribers neatly bound and lettered at the very moderate price of one dollar.

The price to non-subscribers will be seven shillings and six pence Virginia currency . . . Subscriptions are taken in at Mr. Davis's Printing-Office in Richmond, where a specimen of the work is left for inspection." A second edition was printed in Philadelphia in the same year. This was followed by many other American editions—Philadelphia, 1792, 1794, 1801, 1812, 1815, 1825; Baltimore, 1800 (two editions); New York, 1801, 1804; Newark, 1801; Boston, 1801, 1829, 1832; Trenton, 1803, 1812; and Richmond, 1853. There was also a German translation entitled "Beschreibung von Virginien," published at Leipzig in 1789.

This was the first comprehensive treatise to be published on any section of the United States. In it were discussed the boundaries of the State, the rivers, the sea-ports, the mountains, the cascades, the mineral, vegetable, and animal productions, climate, population, military force, marine force, aborigines, etc. It was the precursor of that great library of more or less similar reports that have been issued by the State and Federal Governments. Measured by its influence, it was the most important scientific work published in America up to this time. It laid the foundation for Jefferson's high contemporary reputation as a universal scholar, and for his enduring fame as a pioneer American scientific man.

Further evidence of his interests is given by various printed reports, such as his report of July 4, 1790, presented to Congress on July 13, in which he made suggestions regarding a plan for establishing uniformity in the coinage and in the weights and measures of the United States, the first suggestion of the idea that was subsequently expanded into the National Bureau of Standards, and his scholarly report on the history and economics of the cod and whale fisheries made to the House of Representatives on February 1, 1791, and published on January 8, 1872.

Then there are the manuscript notes left by him, among which are the extensive meteorological records kept at Monticello, his notices of the first appearance of the birds and flowers in spring, and his comparative notes on Indian languages.

But by far the greater part of what we know regarding Jefferson's scientific interests is gathered from the great number of letters that he wrote to various friends and that were published after his death.

Applied science appealed to him quite as much as pure science. He was much interested in horticulture and in every form of agriculture. Botany was always a favorite subject with him, and he had one of the best botanical libraries in America, though on this he never published anything further than the lists of plants in his "Notes on the State of Virginia," which includes the first description of the pecan, written in 1781 or 1782.

Jefferson was an inventor of great ingenuity, as is made evident at once by a visit to his home at Monticello. He also had a keen interest in the inventions of others, especially those of practical application. When he was in France he wrote dozens of letters about inventions. When on a visit to England in 1786 he made careful notes on English domestic gardening and on mechanical appliances. He went to northern Italy in 1787 to inspect machines for cleaning rice, and in 1788 he made other observations in Germany. At the time of the creation of the Patent Office, Jefferson was Secretary of State. As such, he became *ex officio* the Keeper of the Records of the Patents, and according to Dr. Frederick E. Brasch was the most active examining member of the board, and therefore its first administrator. Dr. Brasch says that the scientific foresight that he exercised at this time must be considered the cornerstone of our patent system and patent laws.

#### SPECIAL SCIENTIFIC INTERESTS

Jefferson's keen interest in inventions more than anything else gives the key to his interest in science in general, which was the ultimate practical application of scientific discoveries for the good of man. No matter what line of scientific investigation he undertook, this idea of ultimate practical application seems always to have been in his mind. He seems never to have followed any line through mere pointless curiosity. Even in his study of fossils he appears to have had the idea that some time, somehow, a

knowledge of them would prove of value.

Of his numerous and varied scientific interests, three deserve special mention. First and foremost was his interest in man in general, evidenced not only by his political philosophy but also by his detailed study of the native Indians and his efforts to improve their relations with the Europeans, and by his sympathetic study of the Negroes; second was his interest in the exploration and description of the country; and third was his interest in paleontology.

The French historian and philosopher Guillaume Thomas François Raynal, usually called the Abbé Raynal, a leader of the French freethinkers who was exiled from France in 1781, had maintained, among other things, that Europeans had degenerated in America, and that the American Indians were a degenerate race. Jefferson denied this, and he also denied that the American Indians are inferior to Europeans in the same state of culture. He also said he has supposed that the black man, in his present state, might not be equal to the European, "but it would be hazardous to affirm that, equally cultivated for a few generations, he would not become so." In his "Notes on the State of Virginia" he gave an excellent account of the Indians and described the "barrows of which many are to be found all over in this country," listing the contents of one in the Rivanna River bottom. He also described the characteristics of the Negroes in dispassionate detail.

He was greatly interested in the multiplicity of radically different Indian languages and contrasted this with the lack of diversification among the red men of eastern Asia. He said that "the resemblance between the Indians of America and the eastern inhabitants of Asia, would induce us to conjecture, that the former are the descendants of the latter, or the latter of the former; excepting, indeed, the Eskimaux, who, from the same circumstances of resemblance, must be derived from the Greenlanders, and thus probably from some of the northern parts of the old continent."

In his "Notes on the State of Virginia" he wrote: "Were vocabularies formed of all the languages spoken in North and South America, preserving their appellations of

the most common objects in nature, of those which must be present to every nation, barbarians or civilized, with the inflections of their names and verbs, their principles of regimen and concord, and these deposited in all the public libraries, it would furnish opportunities to those skilled in the languages of the old world to compare them with the new, now or at any future time, and hence to construct the best evidence of the derivation of this part of the human race." He compiled comparative vocabularies of various Indian tribes, which were unfortunately stolen; but some fragments of these are deposited in the American Philosophical Society's archives.

Dr. Clark Wissler has pointed out that at about the same time the Empress Catharine the Great of Russia had adopted the same approach to the study of languages and had written to President Washington for lists of Indian vocabularies.

Jefferson's practical and sympathetic interest in the Indians is perhaps best illustrated by the instructions given by him to Capt. Meriwether Lewis in 1803 when the Lewis and Clark Expedition was about to be organized. These were as follows: "The commerce which may be carried on with the people inhabiting the lines you will pursue renders a knowledge of these people important. You will therefore endeavour to make yourself acquainted, as far as a diligent pursuit of your journey shall admit, with the names of the natives and their numbers; the extent and limits of their possessions; their relations with other tribes or nations; their language, traditions, monuments; their ordinary occupations in agriculture, fishing, hunting, war, arts, and the implements for these; their food, clothing, and domestic accommodations; the diseases prevalent among them, and the remedies they use; moral and physical circumstances which distinguish them from the tribes we know; peculiarities in their laws, customs, and dispositions; and articles of commerce they may need or furnish, and to what extent. And considering the interest which every nation has in extending and strengthening the authority of reason and justice among the people around them, it will be useful to acquire what knowledge you can

of the state of morality, religion, and information among them, as it may better enable those who may endeavour to civilize and instruct them to adapt their measures to the existing notions and practices of those on whom they are to operate . . .

“In all your intercourse with the natives, treat them in the most friendly and conciliatory manner which their own conduct will admit; allay all jealousies as to the object of your journey; satisfy them of its innocence; make them acquainted with the position, extent, character, peaceable and commercial dispositions of the United States, of our wish to be neighbourly, friendly and useful to them, and of our dispositions to a commercial intercourse with them; confer with them on the points most convenient as mutual emporiums, and the articles of most desirable interchange for them and us. If a few of their influential chiefs, within practicable distance, wish to visit us, arrange such a visit with them, and furnish them with authority to call on our officers on their entering the United States, to have them conveyed to this place at the public expense. If any of them should wish to have some of their young people brought up with us, and taught such arts as may be useful to them, we will receive, instruct, and take care of them. Such a mission, whether of influential chiefs or of young people, would give some security to your own party. Carry with you some matter of the kine-pox, inform those of them with whom you may be of its efficiency as a preservation from the small-pox and instruct and encourage them in the use of it. This may be especially done wherever you winter.”

Dr. O. F. Cook wrote that the traditional sponsors of the repatriation and colonization of the Negroes in west Africa were Thomas Jefferson and George Washington. Jefferson studied the racial problem from many sides, including the need of educating the more capable Negroes so that they might furnish the necessary skill and leadership for the new communities in Africa. Washington instructed his executors to provide such education for some of his freedmen.

Almost immediately after his inaugura-

tion as the third President of the United States Jefferson began to make preparations for developing his long-cherished plans for the exploration of the great and unknown West and the discovery and description of its vast resources. His secretary, Capt. Meriwether Lewis, of Albemarle County, Va., who had long wished to go on an exploring expedition, was appointed leader of the first party to be sent out—partly at Jefferson’s personal expense. Captain Lewis chose as his chief associate Capt. William Clark, also of Albemarle County, a younger brother of Gen. George Rogers Clark. The choice of these two leaders was a most fortunate one, and the expedition, which was in the field from 1803 (the year in which the territory extending from New Orleans to British America and westward to the Rocky Mountains known as Louisiana was purchased from Napoleon) until 1806 was highly successful. This was the first of a long series of more or less similar expeditions by which a detailed knowledge of our great West and of its resources and products was gradually accumulated. These expeditions, at first individual enterprises, were later consolidated under the United States Geological Survey.

Jefferson’s interest in exploration was not confined to the land areas. Dr. Brasch writes that in 1806 he made a recommendation for a Coast Survey to Congress, which took favorable action on February 10, 1807, and authorized the President to cause a survey to be made of the coasts of the United States, including islands, shoals, and all other physical features deemed proper for completing an accurate chart of every part of the coast. This project was later organized as the United States Coast (now Coast and Geodetic) Survey. Dr. Brasch adds that during Jefferson’s second term the idea of establishing longitude 0° through Washington (77°03’58” west of Greenwich, England) was much discussed. Jefferson’s thorough knowledge of astronomy and mathematics, together with navigation, enabled him to give much encouragement to members of Congress who wished to establish this standard American longitude. This discussion, according to Dr.



Brasch, eventually led to the establishment of the Naval Observatory and the Hydrographic Office.

Enthusiasm for vertebrate paleontology seems to have been awakened in Jefferson before 1781, after which time he lost no opportunity for securing and examining bones. He was always especially interested in the mastodons, or "mammoths," and in the great sloth that he had called *Megalonyx*. As in other branches of science, his interest in paleontology was chiefly that of an enthusiastic amateur, and a stimulator of interest in others. Dr. Henry Fairfield Osborn has pointed out that in developing his scientific opinions in regard to paleontology he at first quoted the current tradition, later becoming a more serious and independent investigator.

The Lewis and Clark Expedition had brought back a few interesting fossils, which had whetted Jefferson's desire for more. In the summer of 1807 Captain Clark was sent on another expedition to Louisiana that took him through the region of Big Bone Lick, in Boone County, Ky. In obedience to President Jefferson's desires he stopped there and, employing ten laborers for several weeks, made a large collection of about 300 bones, which he shipped to Jefferson at the White House. Here they were laid out in the then unfinished East Room, the "mastodon room," where, at Jefferson's invitation, and later at Philadelphia, they were examined by Dr. Caspar Wistar.

Jefferson's interest in paleontology while President, as remarked by Dr. George Gaylord Simpson, helped to make it a respectable and honored pursuit, and he was largely responsible for bringing together the materials necessary for its advancement. He greatly encouraged the study of vertebrate paleontology by the American Philosophical Society while he was president of it. He also acted for a time as president of the board of trustees of Peale's Philadelphia Museum, which included the first public exhibition of fossil vertebrates, and the first mounted fossil skeleton in America. As the foremost citizen of the young nation, Jefferson's outspoken and excited interest in fos-

sils conferred on their study the dignity and prestige inseparable from his personality and position. But it also brought down upon him the ridicule and wrath of many of his countrymen to whom scientific investigation meant wanton and deliberate neglect of one's proper duties, if not, indeed, atheism. This attitude is well illustrated by a poem written by William Cullen Bryant at the age of 13, which runs in part as follows:

Go, wretch, resign thy presidential chair,  
 Disclose thy secret measures, foul or fair,  
 Go, search with curious eyes for hornéd frogs,  
 'Mid the wild wastes of Louisianian bogs;  
 Or where the Ohio rolls his turbid stream  
 Dig for huge bones, thy glory and thy theme

It is only fair to Bryant to say that this poem, entitled "The Embargo," was published not by himself but by his father, Dr. Peter Bryant, and that he did his best to suppress it.

#### JEFFERSON AND HIS VIRGINIAN COLLEAGUES

It must not be supposed that during his brilliant and eventful career Jefferson was neglectful of his scientific colleagues in his native State of Virginia. Before the American Philosophical Society had elected more than a very few members from Virginia there was organized at Williamsburg on November 20, 1773, "The Virginia Society for the Promotion of Useful Knowledge." The charter was signed by six prominent Virginians, including the Hon. John Page, then lieutenant governor, who was elected vice-president, the president being John Clayton. Of the six who signed the constitution, John Walker was already a member of the American Philosophical Society, which James McClurg joined in the following year, and Mann Page later.

The notices regarding the activities of this Society were published in the *Virginia Gazette* at Williamsburg. There is no reference to Jefferson in any of them, but he was presumably a member, for in a letter written in 1787 in answer to one from John Page, who had urged him to accept the presidency, he wrote that "he should feel himself out of his true place to stand before McClurg," who was probably president at the time.

In its early years the society seems to

have been well received by the people of the colony; but after 1774 there are few published notices of it, although it appears to have kept up an organization for a considerable time.

#### JEFFERSON IN FRANCE

Jefferson was in France from August 6, 1784, to October, 1789, succeeding Benjamin Franklin as Minister in 1785. Dumas Malone writes that, rightly regarded in France as a savant, he carried on the tradition of Franklin, but until the end of his stay he was overshadowed by Franklin's immense reputation. His attitude toward Franklin, whom he regarded as the greatest American, was one of becoming modesty, without a tinge of jealousy.

At that time France was regarded as the leader in the biological sciences; but Jefferson thought little of French science. He vigorously combated what he considered the disparagement of the American fauna by Georges Louis Leclerc, Comte de Buffon, who maintained that the animals common to both the Old and the New Worlds are smaller in the latter; that those peculiar to the New World are on a smaller scale; that those which have been domesticated in both have degenerated in America; and that, on the whole, America exhibits fewer species. In order to correct these impressions, Jefferson procured from America at his own expense and presented to the Comte de Buffon the bones and skin of a moose, the horns of another individual of the same species, and horns of the caribou, the elk, the deer, the spiked horned buck, and the roebuck of America. Buffon also maintained, much to the annoyance of Jefferson, that the American mastodon, or "mammoth," was the same as the elephant of Africa and Asia.

He does not seem to have had a very high regard for Buffon. In a letter to President Madison of William and Mary he wrote: "Speaking one day with M. de Buffon on the present ardor of chemical inquiry, he affected to consider chemistry but as cookery, and to place the toils of the laboratory on a footing with those of the kitchen. I think it, on the contrary, among the most

useful of sciences and *big* with future discoveries for the utility and safety of the human race."

#### CONCLUSION

Dumas Malone writes that Jefferson became associated with an extraordinary number of important societies in various countries of Europe, as he had long been with the chief learned, and almost all the agricultural, societies of America. Much, but by no means all, of this recognition was due to his political prominence. On December 26, 1801, he was elected an "associé étranger" of the Institute of France; if this was by virtue of his position at all, it was because of his presidency of the American Philosophical Society. Mr. Malone says that this signal honor, which during his lifetime was shared by no other man of American birth and residence, may be attributed to his reputation in France as the most conspicuous American intellectual. He himself modestly interpreted it as "an evidence of the brotherly spirit of science, which unites into one family all its votaries of whatever grade, and however widely dispersed throughout the different quarters of the globe."

Modern scholars, according to Mr. Malone, have recognized Jefferson as an American pioneer in numerous branches of science, notably paleontology, ethnology, geography, and botany. Living long before the age of specialization, he was a careful investigator, no more credulous than his learned contemporaries, and notable among them for his effort in all fields to attain scientific exactitude.

But Jefferson saw all these branches of science not as independent units but as integral parts of an all-embracing whole that should be developed for the sake of the future happiness and prosperity of mankind, for the ultimate good of his fellow men was always in his thoughts. It was this scientific foresight that led him to advocate so vigorously the idea that science would be the cornerstone of our Republic. In 1789 he wrote to President Willard of Harvard: "What a field we have at our doors to signalize ourselves in. The botany of America is far from being exhausted, its mineralogy

is untouched, and its natural history or zoology totally mistaken and misrepresented . . . It is for such institutions as that over which you preside so worthily, Sir, to do justice to our country, its productions, and its genius. It is the work to which the young men you are forming should lay their hands. We have spent the prime of our

lives in procuring them the precious blessings of liberty. Let them spend theirs in showing that it is the great parent of science and virtue, and that a nation will be great in both always as it is free."

Such was the opinion of Thomas Jefferson, the most versatile and the most influential of our American scientific men.

ETHNOLOGY.—*Pacific Coast Athapaskan discovered to be Chilcotin.*<sup>1</sup> JOHN P. HARRINGTON,<sup>2</sup> Bureau of American Ethnology. (Communicated by WILLIAM N. FENTON.)

The purpose of this paper is to announce a discovery of great importance to ethnology made on my recent field trip to the Pacific Northwest. This consists of the disclosure that the so-called Pacific Coast Athapaskan, about which much has been written in the past and which has been compared to Sarcee, Navajo, etc., is composed of a string of Chilcotin languages straggling down, and near, the west coast of the United States proper from what is now southern British Columbia to almost within sight of San Francisco, Calif.

The interior of Alaska and of most of northwesternmost Canada is occupied by a number of languages of the so-called Athapaskan stock. In the forties of the past century Hale recognized Umpqua, of what is now Oregon, as belonging to this stock, and in the fifties Turner added the Apachean-Lipanan of the southern deserts and southwesternmost Great Plains of the United States to this stock. It became gradually clear through further study that the main body of the Athapaskan stock is that of the far northwest of the North American Continent, and that from there two linguistic prongs have extended southward: (1) a Pacific Coast prong like the letter *i* (the dot would represent the Chilcotin), and (2) a

more easterly prong accomplished via the "Great North Trail" along the eastern base of the Rockies south to where these mountains break down and thence west, or else via the intramontane region south, like the letter *j* (the dot would represent the Lipanan). In case of intramontane accomplishment, the *j* would have been executed hook first. The present study has succeeded in eliminating from the general Athapaskan problem the Pacific Coast prong by discovering it to be a unit, having as its northern head part of the Fraser River drainage of British Columbia, Canada, and as its southern extent the zigzag watershed which bounds to the south Eel River's Southfork, in Mendocino County, Calif. The expression in the Chilcotin languages is just the opposite of this; in the manner of Chilcotin languages Indian talk, the peoples in their migrating layer on layer southward were working a language-substitution from the tail of the earth, which is located at what is now called Alaska and westernmost Canada, toward the earth's head, which is located in the far south. Genetic relationship of the Athapaskan languages with the Tlingit (language of Sitka and Juneau, Alaska) and the Haida (language of the Queen Charlotte Islands) was shown by Sapir years ago. Work done by me a few years ago showed how close this relationship is, likeness extending to some 300 features.

Five detached bodies of Chilcotin languages were worked on:

(1) The most northerly of these was the Chilcotin proper, which takes its name from Chilco Lake, just east of the Cascade Range of mountains, in an easterly direction

<sup>1</sup> Received April 12, 1943.

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